39] $y = x\sqrt{1-x}$

$dy = \left(x\sqrt{1-x}\right)' dx$

If $y = f(x)$ then $dy = f'(x)dx$ ← $\frac{dy}{dx} = f'(x)$

$dy = \left(\sqrt{1-x} + x\left(\frac{1}{2}(1-x)^{-\frac{1}{2}}(-1)\right)\right)dx$

41) $y = \sqrt{3x-2} = (3x-2)^{1/2}$

use dy to approx Δy as $x: 2 \to 2.03$

$y' = \frac{1}{2}(3x-2)^{-1/2}(3)$

$y' = \frac{3}{2\sqrt{3x-2}}$

$f(2.03) \approx f(2) + f'(2)(2.03-2)$

$f(x+\Delta x) \approx f(x) + f'(x)(\Delta x)$

$f(2.03) \approx f(2) + f'(2)(.03)$

$f(x+\Delta x) - f(x) \approx f'(x)(\Delta x)$

$f(2.03) \approx \sqrt{3(2)-2} + \frac{3}{2\sqrt{3(2)-2}}(.03)$

$\frac{f(x+\Delta x) - f(x)}{\Delta x} \approx f'(x)$

$f(2.03) \approx 2 + \frac{3}{4}(.03)$

$= 2 + \frac{.09}{4} = 2.0225$

$f(2.03) \approx 2.0225$

$f(2.03) \approx 2.022374\ldots$

(41) $y = \sqrt{3x-2} = (3x-2)^{1/2}$

$y' = \frac{1}{2}(3x-2)^{-1/2}(3)$

$y' = \frac{3}{2\sqrt{3x-2}}$

use dy to approximate Δy as x goes from 2 to 2.03

if $y = f(x)$ $\rightarrow$ $\frac{dy}{dx} = f'(x)$

$dy = f'(x)\,dx$

$f(x+\Delta x) \approx f(x) + f'(x)(\Delta x)$

$f(x+\Delta x) - f(x) \approx f'(x)(\Delta x)$

$\frac{f(x+\Delta x) - f(x)}{\Delta x} \approx f'(x)$

$f(2.03) = f(2+.03)$

$f(2.03) \approx f(2) + f'(2)(.03)$

$f(2.03) \approx \sqrt{3(2)-2} + \frac{3}{2\sqrt{3(2)-2}}(.03)$

$f(2.03) \approx 2 + \frac{3}{4}(.03) = 2 + \frac{.09}{4} = 2.0225$

$f(2.03) = \sqrt{3(2.03)-2} = \sqrt{4.09} \approx 2.02237$

$f(2.03) - f(2) = \Delta y$

$f'(2)(.03) = dy$

43) $\frac{x}{x^2+1}$; $x = 2 \mapsto 1.96$

$f(1.96) \approx f(2) + f'(2)(-.04)$

$\frac{(x)'(x^2+1) - (x)(x^2+1)'}{(x^2+1)^2} = \frac{(x^2+1) - (2x)(x)}{(x^2+1)^2} = \frac{dy}{dx}$

$\frac{2}{2^2+1} + \frac{(2^2+1) - (2x)(2)}{(2^2+1)^2}(-.04) = \Delta y$

$\frac{2}{5} + \frac{5-8}{25}(-.04)$

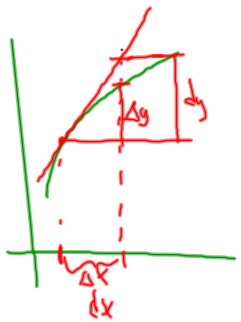
$\frac{-3}{25}(-.04)$

$\frac{2}{5} + \frac{.012}{25} = .4 + .0048 = .4048 = f(2) + f'(2)(\Delta x)$

$\approx$

$f(1.96)$

$f(1.96) = \frac{1.96}{(1.96)^2+1} \approx .4048248513$



3.8 homework

2010-11-19 Pd 3